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Interactive comment on "GREEN: A new Global Radiation Earth ENvironment model" *by* Angélica Sicard et al.

Anonymous Referee #2

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General Comments:

This manuscript reviews the features of many previous radiation belt models including AE8/AP8, SLOT, OZONE, etc, as well as discusses about their advantages and drawbacks. Then they introduce a new comprehensive radiation belt model named GREEN (Global Radiation Earth ENvironment). This model is an integration of the previous models and also can be thought of as a correction to the AE8/AP8 models. GREEN selects the most suitable models for different regions and particle species/energies and combine them, which helps save users' time and effort to select models for their studies. As a user of the ONERA library, I appreciate the authors' effort to build such a complete model and hopefully it will be released with a user friendly interface in the future. I think this work is definitely valuable and interesting, but some revisions need

to be made before publication.

Specific Comments:

The problem that bothers me most is the discontinuity between different regions where the boundary of two sub-models (the models that is used in GREEN, such as AE8 and SLOT) exists. The sharp boundary between AE8 correct and SLOT at about L*=2.5 in Figure 13 is an example. The authors have realized this problem and stated in the paper that this problem is to be solved in the next version. Could you please at least explain how you are going to do it or show some of the potential methods to solve this problem? I suggest to show some preliminary result even if you use very simple smoothing methods such doing running average on each dimensions and repeat it for a few times. Dealing with the boundaries is a critical step in the work of combing different things.

Another thing is that I didn't notice any clear statement in the paper that describes the input and output parameters. I believe for most of the users like me would like to get this kind of information quickly and directly. The first sentence in the abstract tells us the scope of the model but it doesn't say that the solar cycle variation is included too. I suggest to add some more descriptions on the input and output parameters as well as the scope of the model in the abstract.

Here are some more detailed questions and comments:

Page 1/ line 29: asses -> assess

Page 4/ line 7-8: Did you interpolate in between the AE8 MAX and AE MIN and if so, how did you do it?

Figure 3: In the paragraph above this figure, it is mentioned that AE8 corrected is applied for >1 MeV electrons. But in this figure, it looks that the correction starts at about 700 keV. Could you please clarify that in the text?

Page 5/ line 3: It is not clear just to say "a mean model". I suggest to change it to

something like “a model that reflects the mean flux along the magnetic field lines”.

Figure 5, 6 and many other figures: There are too many lines in the figure which makes it hard for the readers to see the data clearly. It would be nice if you could reduce the lines you plot on one figure. Figure 5 has a large blank at the top and I suggest to change the y axis range so that the data is shown more clearly. Also, L star is used in the paper, but in some of the figures it is shown as “L”. It would be better if they are accurate and shown as “L*”. For figure 6, there is no y axis for the F10.7 index and it is better if there is one on the right or just plot it as a separate panel.

Page 7/ line 5: provide->provides; maximum flux-> fluxes

Page 8/ line 19: How is this extrapolation done? How did you choose the fluxes at the lower energy boundary.

Page 9/ line 8: used also -> also used

Page 10/ line 10: which lies “below” the general tendency of the curve.

Figure 10, could you please shrink the y axis range to make the variation of the lines clearer. Same thing with Figure 11.

Page 12/ line 13: non trapped -> untrapped (to be consistent with the one on Page 11)

Figure 16: Since NOAA satellite is at low altitude, it will only measure the particles with really small pitch angles at large L shells. But GREEN provides an average flux of all pitch angles. Most of the times, the pitch angle distribution peaks at 90 degree, so I would expect NOAA lines generally lie below the GREEN lines. But this is not the case especially for the >30 keV electrons. Could you please comment on this?

Page 17/ line 18: protons-> proton fluxes

Page 17/ line 19: extend OPAL model at-> to higher altitude

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